Victorian Micro Users Newsletter

KAOS

For People Who Have Got Smart

KIM-AIM-OSI-SYM-APPLE-MAC-IBM-RABBLE65-C64-VIC20-PEACH-UK101

Notice the new header? Do you like it? It is only temporary until someone wins the HEADER COMPETITION!

Send your entries to KAOS, 24 Archibald St, Pascoe Vale, Vic.3044. by 9th August. The design shouldn't take up more than 1/3 of the front page (ie. 85x170mms.) The name KAOS must be large, and preferably there should be room for 6 or more names and telephone numbers like the old header. These should be fairly easy to alter when an office bearer changes. Perhaps the design could be held on tape or disc for easy adjustment.

Let your imagination loose and get your graphics systems going and see YOUR header on the front page of KAOS every month!

This month, we are publishing a list of software available on cassette tape from John Whitehead, 17 Frudal Cres, Knoxfield, 3180. Ph763 5983. Corresponding manuals and some eproms are available also.

Next month's issue will be a special one if you help to make it so. We are looking for a good technical article on every type of computer used in the club - OSI, Rabble, Apple, Macs, Commodore, BBC, IBM. Now's the time to write up that interesting mod you made, or that super program you wrote.

AUTHORS, PLEASE NOTE that if some pages in this newsletter are faint and difficult to read, it isn't always the fault of the reproduction process. Please invest in a new ribbon for your printer. Double striking or emphasising are not apparently an answer, the result with an old ribbon is still rather grey and reproduces poorly.

The next club meeting will be at 2pm on Sunday 28th July at Essendon Primary School, Raleigh St. The deadline for newsletter articles is the 9th August. Why not bring them to the July meeting?

INDEX

APPLE HARDWARE

SIMPLE SOUND GENERATOR - BY R.WOODHOUSE

An alternative way to produce sound from your APPLE][computer is to
build a simple audio generator which may be hooked up to your O/P
port.

The advantage of this is that tones are readily available instead of
just the clicks that the APPLE produces.

The circuit is simple and cheap to build. Any transistor radio
speaker may be used as long as it is a high impedance type.

Pins 1,2 and 3 on the O/P port control the frequency generated and pin
4 decides whether the output is on or off. The output is enabled when
pin 4 is high.

To alter the range of frequencies produced you may change the
capacitor C1 to a different value. Larger values give a lower
frequency and so forth.

Numerous sounds may be made with this device, it only requires you to
think up the appropiate software.

Fig. 1 gives a demonstration program to get you going.

```
10 POKE 49246,0
20 FOR X=49240 TO 49244 STEP 2
30 POKE X,0
40 FOR A=1 TO 1000:NEXT
50 POKE X+1,0
60 NEXT X
70 POKE 49247,0
80 FOR A=1 TO 2000:NEXT
90 GOTO 10
```

This short program will turn on the sound generator (line 10), cause
each note to be produced for 1 second and then after a 2 second pause,
to repeat the sequence again. By playing with the delays in line 40
and line 80, different types of sounds may be produced.
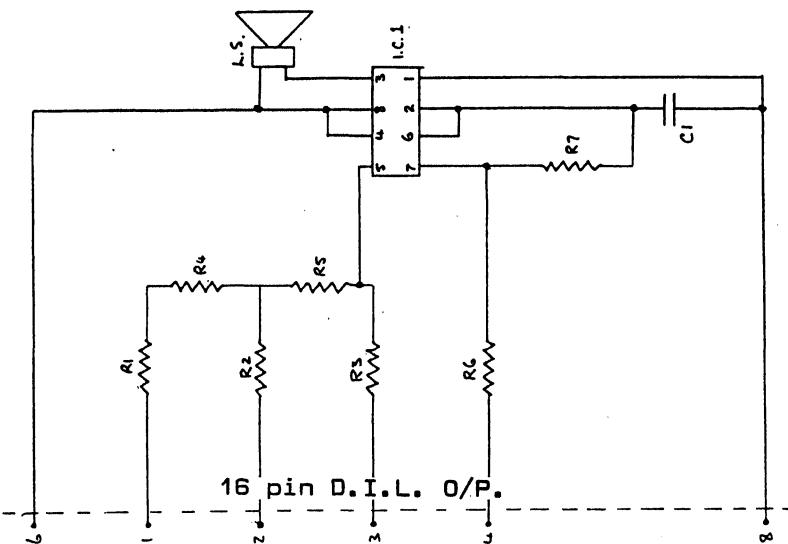

```
PARTS LIST
IC1        NE555
R1,R2,R3   4K7    1/2w resistor
R4,R5      2K2    1/2w resistor
R6         1K     1/2w resistor
R7         220K   1/2w resistor
C1         .0047 µF greencap
L.S.       65R(approx) speaker
```

16 pin D.I.L. O/P.

2

6502 MACHINE CODE GROUP

A NEW SESSION STARTING AT AN
ELEMENTARY LEVEL WILL COMMENCE ON
THURSDAY, 11th JULY, 1985
AT BLACKBURN SCOUT HALL,
KOONUNG ROAD BLACKBURN
AT 7:30 p.m.

ANY ONE INTERESTED IN LEARNING THE
6502 PROGRAMING LANGUAGE IS WELCOME
Note: This group meets every second
THURSDAY of the MONTH

EPROM programmer

The KAOS tape library has a Superboard cassette version of the source for the programmer in KAOS march 85.
It also has the programmer program on tape in m/code for loading in BASIC from $0400 to $0B0E. Both for $2 plus $1 p&p.

The program for the simple EPROM programmer for 2716, 32 & 64 in KAOS Dec. 83 is still available at the same price.

QUESTION TIME??

From Bob Best,

Like many others now with second hand OSI machines, I am still learning what some people learnt many years ago. I feel that I may not be the only one that is in need of some tips from the "experts". To this end, I would like to ask the following questions.

(1) PEEK and POKE to location "0". What does it do? - I found it in the WP6502 program.
(2) Poke to locations 49156 etc. found in BEXEC* with OS65D3.3 + COMPDOS 1.3. This one hangs my system (C4PMF standard)
(3) Why is it that when you create data files with say 2 fields of 34 charactera that the system puts in a couple of extra, yet for 30 and 40 it is OK?
(4) How do I relocate COMPDOS 1.2 in a 48K system? I have changed the step in BEXEC* to put COMDOS up at BA00 but it does not work well at all.

PS Does anybody have a copy of disk CA-14 that runs the Votrax board for the C4PMF?

.....please send answers to KAOS too. Editor

SIMPLE MEMORY EXPANSION FOR C1P's by Darryl Lock

If you like to write in assembly language, you will know just how little memory space is left after loading OSI's assembler into a standard C1P.

Assemblers have been modified to run in ROM, of course, and that is one way to relieve the problem. However 16k is a nice amount of RAM to have, even for the Basic programmer. This simple method of memory expansion was devised by Bob Crockford and appeared in OSUG newsletter 14. I improved on the design to make it suitable for both series 1 and 2 machines, and it was published in OSUG newsletter 24.

This improved design appears below. It has been a popular mod for OSUG members, and is the cheapest and simplest mod possible.

PIGGYBACKED
2114L RAMS

PIGGYBACKED
74LS 138
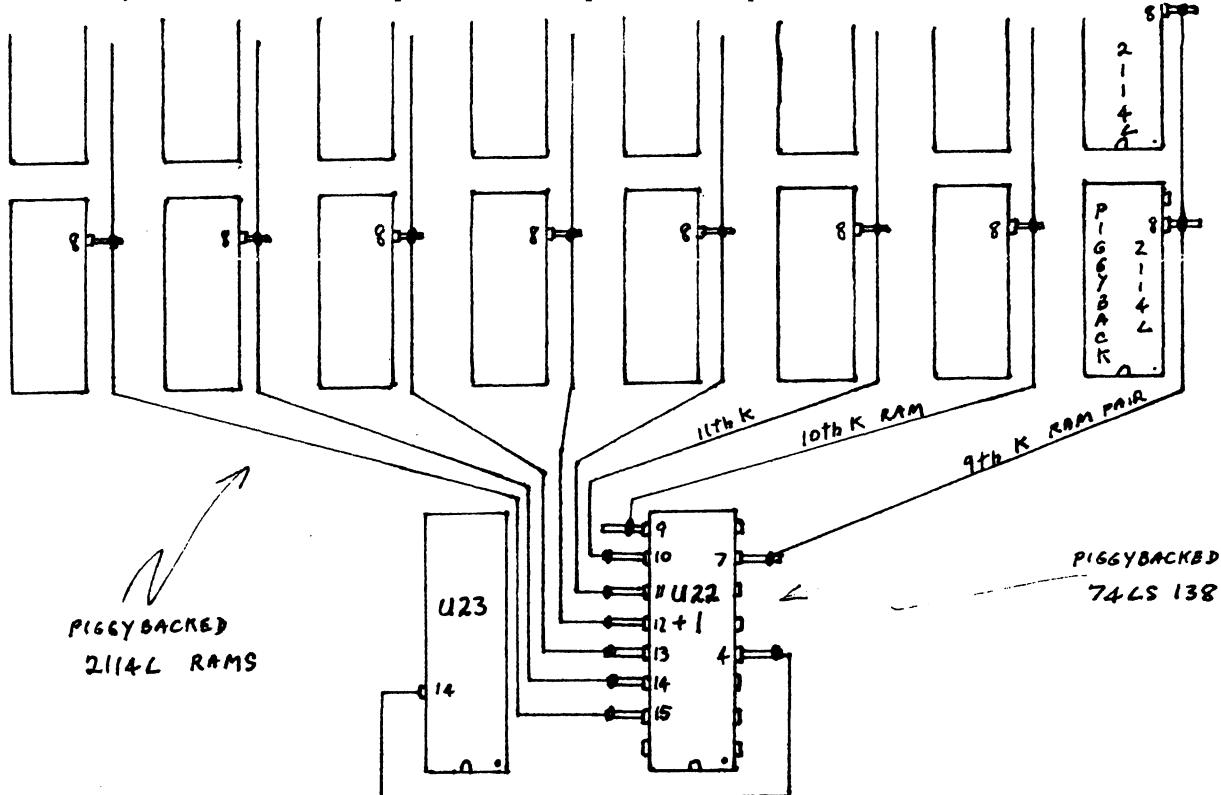
The diagram above is quite straightforward. Parts required are a 74LS138 and 16 x 2114L integrated circuits, and some wire wrap or other fine, insulated wire. Bend out pin 8 on each of the 16 x 2114L's and piggyback to those on the board. Solder the pins carefully. Bend out all the pins shown above on the 74LS138 and piggyback to U22. Then wire as in the diagram. You don't need to do all the RAM at once if your money won't stretch that far. Just adding the two on the right will give you 9k. Alternately, you might like some RAM protected from BASIC for M/C programs. For this you could just install the last 2 or 4 chips.

- -

ADVENTURING - Part two coming up!

OSUG is just about out of ideas for articles on the OSI. From the end of this year I intend to quit and just become a normal KAOS member. Many issues ago, I promised an adventure article, and the OSUG pages will be occupied with this from next week. Unfortunately a violent storm destroyed the cassettes of the adventure I planned to publish in February. I do have some paper copies and will go back to work on them. However the articles will go much further, making suggestions on the design of the games, and some ideas that will make designing your own adventure easier.

PASSING OF AN ERA

It was with great sadness that I read a simple note from Rosemary Eyles with the bad news about Ian last month. Despite Ian's long illness, the Eyles family worked tirelessly and without financial reward, to compile, print, and mail up to 500 newsletters each month. Also, meetings were organised, schools were helped, and members received personal assistance whenever needed. KAOS members owe the Eyles family a debt that can never be repaid.

PARALLEL PRINTER BOARDS FOR 3 x 33¢ STAMPS

There were more of the parallel printer boards than I thought, and I still have 10 left. One of the first to get a board, Peter Westley, has got it going without any problems and uses it to drive a BMC BX1000 printer. Peter has also designed a very interesting ACIA mod, which appears below.

1200/75 SPLIT BAUD RATE FOR MODEM by Peter Westley.

In Australia, we use the CCITT standards for modem communication. The two parts of this standard used the most are the V.21 and V.23.

V.21 is used for 300 Baud in both directions. Most of the designs in KAOS and other magazines cater to this standard.

V.23 is for use with 1200/75 modems. This means that information going to the mainframe is sent at 75 Baud (about typing speed), while return data is sent at 1200 Baud.

It is a fairly simple modification to use the split baud rate facility of the OSI's ACIA for use with the 1200/75 modem. This feature is very useful to me as I am a student of electronic engineering at RMIT. Being able to use the RMIT mainframe from home saves me a lot of time.

The circuit is constructed with the same principle the parallel printer interface uses. In my case, a wire wrap socket feeds through to the original ACIA socket so that all the ACIA pins are available. The whole circuit was constructed on a small piece of veroboard.
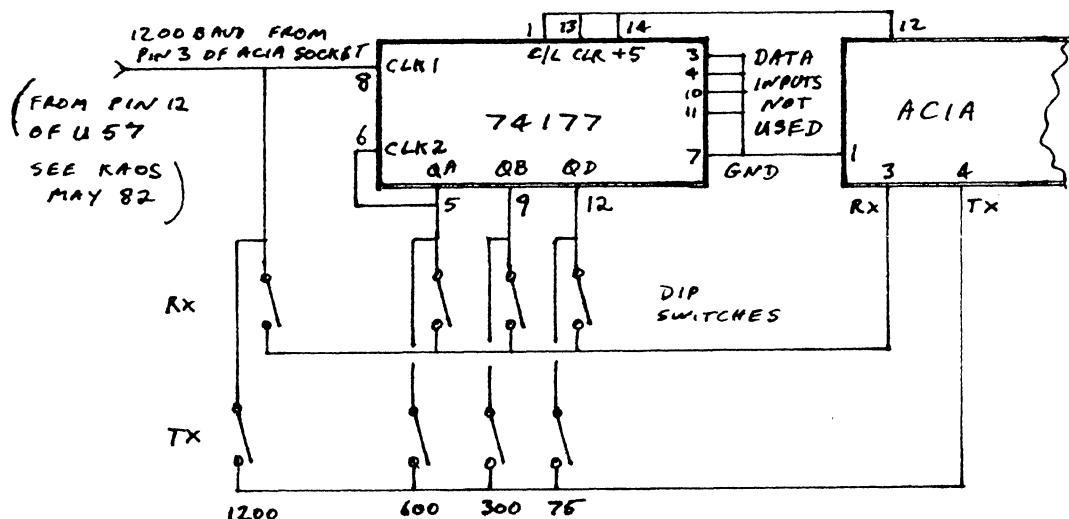
Notes:- 1 Cut off wire wrap pin 4 on ACIA socket
2 Bend out pin 3 of ACIA and solder wire from DIP switch directly to it.
3 Any other binary counter could be used.
4 Two single pole rotary switches could be used instead of the DIP switch.

My address is 39 Craig Rd, Donvale, VIC. 3111 if you have any queries.

Ed Richardson.

THE CPM FILE
============

This article nearly didn't get written due to a procession of failures in my system you would not believe. If it were a horse I would have shot it to put it out of my misery, but since it is a smart machine, not a dumb animal, it can suffer surgery at my hands, without benefit of anaesthetic. I am feeling vindictive and put upon, see. I won't give you the gory details now, coz I'm still operating and so is it, just. You can ask me at the next meeting if you are there, otherwise you will never know.

Last month I embarked on a monologue (no it is not a boat) on the subject of 8" disks and promised to tell you all about the 5" variety this month. I mustn't disappoint my public out there, so here, despite enormous difficulties, is the next thrilling episode, in the context of CPM, although much is applicable in the wider general context.

As with 8" disks you have single- and double-sided. However, the system can't tell which it is from the index hole, it has to be programmmed in. Next we find that there are currently four kinds of disk densities,

TYPE	DENSITY	SPACING	COERCIVITY	DRIVE SPECIFICATIONS & CAP.		
1-	single	48 tpi	300 oersted	32-40 track	300rpm	100kb/s
2-	double	48 tpi	300 oersted	32-40 track	300rpm	200kb/s
3-	quad	96 tpi	300 oersted	80 track	300rpm	400kb/s
4-	quad-HD	96 tpi	600 oersted	77 track	360rpm	800kb/s

(and quad-HD 192 tpi 600 oersted are coming soon, with up to 3.5 Mbyte/disk capacity. Special drives required.)
No, it is not a misprint, some H-P systems run 32 tracks; the capacities are unformatted and per side so double it for DS disks.

Note that type 4 is the correct disk for 8" lookalike drives and may not work properly on lesser drives (it is the coercivity that causes that problem) just as types 1, 2 and 3 won't work satisfactorily on lookalike drives. Type 3 will work fine on 40 track drives, but depending on quality, types 1 and 2 may give excessive errors on 80 track drives. These problems are most likely to occur on the inner tracks where the signal is weaker and the bit density is higher. So if you have been having problems, check your disk type.
In CPM the standard disk is the 8" SSSD. In the 5" world there is no standard, and every system designer tries to build a better mousetrap. I currently have listings of over 100 different disk formats, about 20 of which I have used to configure one of my drives to read a 'foreign' format. In fact quite a number of systems now have this foreign format capability.

Next month, by request, I will discuss some of the differences between CPM and 65D at the philosophical level, as they do after all use totally different processors. The Rabble incidentally cheats under CPM and uses both, but you will have to wait for the next thrilling episode for the details. (Sorry but sound effects don't reproduce very well on paper.)   RMH

THE POWER OF VISICALC   by Bob Geels.

@IF(You have a copy of Visicalc), @AND((You are unaware of its full potential), @OR(You thought it was just a dull business program)) Then @ERROR, because Visicalc is a Powerful tool which can provide many hours of entertainment leading up to practical application. To demonstrate the ease with which a mass of spreadsheet formulae can be created, simply type the following string commands:-

```
/CY         (Type "Return" after each line.)
1
>B1
1+A20
/R
C1.J1
R
>A2
1+A1
/R
B2.J2
R
/R.J2
A3.A20
```

Now watch as you type RRRRRRRRRR. -You have just created "TWO HUNDRED FORMULAE !", each one different. Move the cursor to the right to see the extent of your work. All answers in this case initiate from the value in memory cell A1. Try changing the value in A1 and watch the relationship of the other formulae. What we did was to "Replicate" a formula horizontally across Row 1 and another formula across Row 2 which we replicated down each column. The "Replicating" power that created this simple arithmetic progression, can be used for anything from morgage calcs to cylinder volume calcs to bridge stresses to company take-overs. How?
Visicalc gets its power from two areas:-
"/" Command
"@" Function
"/" Commands allow you to "Replicate", save, print, insert, delete, fix windows, change format, etc. "@" Functions are divided into two areas:-
Mathematical Operators
Logical Operators
Math operators can give you @SUM, @AVERAGE, @EXP, @LOG and Trig operators such as @SIN, @TAN, @ACOS and @PI. Logical operators can give you @IF, @AND, @OR and @NOT. @IF can be a very powerful tool to change a formula depending on preceeding parameters or results, as Visicalc calculates.
First lets try some Mathematical operators. If you still have the block of formulae displayed, underline by typing:-

```
>A21
/-=
/R
B21.J21
>A22
```

Now lets find the sum of all the numbers in column A with:-

```
@S
A1.A20
```

Notice that only the first letter of "sum" needs to be typed. Visicalc assumes the rest. With a simple replication, we can find the totals of all the columns. Type:-

/R ..and then "Return" to tell Visicalc that only one formula is to be replicated. Type:-

B22.J22 ..and "Return" gives the range over which it is to be replicated. Type:-

RR ..to tell Visicalc that both locations in each formula are to relate to their own columns. O.K.? Now lets find the average of all the column totals. But first a problem. If we place the formula in column A, and we change the value in A1, we will get the wrong answer. Visicalc calculates each cell in turn down a column and then each column from left to right. Our (average of the sums) formula would be calculated before all the sums were calculated. This is called back to front referencing. (Referring to a cell which has not yet been calculated.) Sometimes this can be overcome by typing:- /GOR This causes Visicalc to calculate each row first from top to bottom. This will not work in this case. Can you see why? Try it, and change the value in A1. (/GOC for column calc) Another solution is to type "!". This tells Visicalc to perform another calculation, but if you forget, you have wrong answers. Not a very good idea.

The best solution is to calculate the average in the last column with a sum in it. Type:-

> I24
AVERAGE=
> J24
@A
A22.J22

Now for a practical application. Clear the screen with /CY.
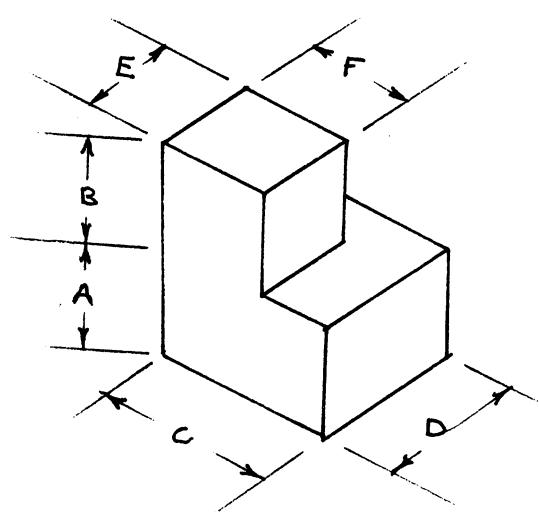
Assuming that you have containers with a shape as per the diagram. We want to calculate its volume in cm steps from the bottom but our containers are all different sizes. We can use an @IF function to tell Visicalc to change from calculating the large rectangle to the small rectangle. First some lines:-

> A43
/-=
> A2
/-=
/R.A43
B2.F2
> A1

Use the arrow key to enter some dimensions in Row 1 with each column letter representing a Dimension on the Drawing. Now the @If formulae. Type:-

> A3
@If ((1 + A2>(A1+B1)), @NA, (1 + A2))

This formula looks at the height. If the height is greater than the total height of the container, then further calcs. are not applicable. Type:-

```
>B3
@If ((A3 < A1), (A3 * D1 *C1), (A1 *D1 * C1))
```

With a little practice this 34 character formula is soon surpassed by formulae over 100 characters long. This formula calculates volume up to the height of the lower portion. Above that, it only gives the full volume of the lower portion. Now a formula for the top portion. Type:-

```
>C3
@IF((A3<A1),0,((A3-A1)*E1*F1))
```

This formula gives 0 for the top portion if the height has not reached it and calculates for the top portion only, by subtracting the height of the lower portion. The last formula is the sum of the calculations for both portions. Type:-

```
>D3
+B3+C3
>A3
```

Confused at the complexity of the @IF formula? Lets replicate the formulae into a block and all will become clear. Type:-

```
/R.D3
A4.A42      Watch the screen as you slowly type:-
RNNRRNRNNNNNRNRNNNRR
```

Can you understand why some references (Parts of the formula) were "Relative" and some were "No-Change". Did you notice that all "No-Change" references were in Row 1. That's because they are the constants and are not changed by a variation in height. Other references had to change depending on their own position according to height.

If your total height falls somewhere below 40 then you will notice that your height above total height in Column A becomes NA (Not applicable), clearly marking the end of calculation. Columns B and C show the change in the formula used from the @IF statement as the calculations progressed. Try changing the values in Row 1. Try typing:-

```
>A1
>A2
/TH   ...and Return, then scroll down the page.
```

Now for something completely different. Type:-

```
/CY
/GC37
RADIAN DIVISION NO
>A4
/-=
>A2
/-=
/R.A4
A2.B2
>A3
20
>A5
```

```
(@PI/A3)+A4
>B5
/F*@SIN(A5)*17+18
>A5
/R.B5
A6.A126
NRR
>B5
Now scroll down the page and watch the @SIN wave.
```

HEXDOS Disk Operating System
by M. Howell 'phone (Ø3) 221 2491

HEXDOS was created by Steven Hendrix for the OSI Superboard series
one or C1 computer. Three versions are available-V2.4 for the SYN6ØØ
monitor, V3.Ø for the CEGMON monitor and V4.Ø which runs with either
monitor using location $FEFF to evaluate which system monitor is
installed. Hexdos uses BASIC in ROM and calls various subroutines as
part of the operating system which also uses some of the disk boot
routine located at $FCxx. The DOS loads from track zero to $Ø3ØØ for
 8 pages finishing at $ØAFF. The Basic pointers are reset to begin
from $ØBØØ(which is a null) with the first line pointer now at $ØBØ1
and $ØBØ2.

This causes no compatibility problem with standard Basic programs
but Hexdos(along with everybody else) uses the vacant memory of page
two as a file information storage area. This area is also used
during a disk boot loading the BASIC in ROM cold start routines
there and modifying selected locations to remain compatible with the
DOS. Three blocks of code are moved to page two(for memory size,
terminal width etc.) finally to be overwritten with #$FF's which
are the initial values given to the data file headers.

Page one is used as a transient memory area by Hexdos which also
uses the NMI vector at $Ø13Ø. After a track load Hexdos calls a
BASIC in ROM routine to $Ø1ØØ which corrects the Basic line pointers
using the null at the end of each line as a reference. The area from
$Ø1ØØ to $Ø1Ø7 is also used by Basic to build an ascii represent-
ation of a floating point number but as these routines are called
separately no conflict occurs. The NMI vector is used by Hexdos to
support the real time clock at $CØ2Ø on the OSI 61Ø board which,
amongst other things, can be used to turn off the disk drive motor
after accessing the disk. Hexdos also supports a printer port at
$D9ØØ if you install the hardware. This location is OK for a C1
series one but conflicts with the screen latch at $D8ØØ to $DBFF on
the C1 series two.

My interest with Hexdos began some time ago when I purchased a 2nd
hand C1 computer with a 64x32 screen driver,(S.E.K.) Cegmon monitor
and 61Ø board. As supplied this machine would run with Hexdos,
despite the 64x32 screen hardware, as the Cegmon monitor has its own
screen driver and the keyboard was still in C1 format. As I owned a
C1 series two my decision was to convert this machine to a psuedo C4
by reversing the keyboard diodes and adding 56Ø ohm resistors from
each diode to earth. This effectively gave me a C1 and C4 machine
but now a disk system that was no longer compatible with both
machines. Enter HEXDOS FOUR Mk2. 10

To make Hexdos 4 compatible with both C1 and psuedo C4 machines the
first thing was to remove all direct calls to the polled keyboard
port at $DFxx. Next was the screen clear routine(was CHR$(3) but
changed to CHR$(127) to remain compatible with Basic programs
written for Dabug) and finally the patch line pointers routine
was moved to $0133 as it overwrote the user vectors of RESMON.III
(located at $012A to $012F) which gives D/C/W/M/1/2 on BREAK. An
unexpected problem arose when this disk was booted on a machine
using a Tasan video board with a Dabug C4 monitor-rather than doing
an indirect jump to the location loaded from track zero and placed
in $FD and $FE the monitor did a direct jump to $2200 expecting to
find 65D but unfortunately not Hexdos!!! The solution was to start
Hexdos at $22xx and insert a block move routine beginning at $2200
which down loaded the DOS to $0300.

Since then a number of features were added to make the DOS more
versatile. The main addition is the file append patch published in
PEEK 65 V5/N4 P23 which allows another program to load into memory
after the end of the first. One requirement is that the line numbers
of the second program be higher than the first and is typically used
to load utility programs with line numbers beginning at 60000. The
printer port was changed to $F000 to allow use of the cassette ACIA
and a Centonics interface with a CTS line running at 4800 baud.

One unfortunate fact that arises is the lack of support for the
 48x12 screen format available on the C1 series two and the conflict
of page zero locations used by Hexdos and Dabug.(In my opinion
this conflict can only be resolved with the removal of page zero
usage by the Dabug screen editor and 48x12 screen driver) A
decision was made to relocate the file header information in page
one from $0108 to $0128. This reduced the number of files that could
be opened at one time from 24 to 4, enough for most applications and
still two more than available with 65D. Page two could now be reused
for those innumerable small machine code programs and most import-
antly, is now available for a SYN600 compatible 48x12 screen driver,
selectable on disk boot via the MENU program used by Hexdos Four
Mk2. A check is also made to see if Dabug is installed allowing
implementation of the screen freeze routine at $FAC4.

Other minor alterations to Hexdos were- 1/the use of the backslash
(shift/L on most machines) rather than shift/return to invoke the
line editor, 2/removal of the SAVE command requiring that all prog-
rams be saved using a filename allowing the implementation of, 3/a
check is made to see if enough tracks remain on a disk for the prog-
ram that is to be saved, 4/the sound driver now uses the RTS line of
the cassette ACIA and not the disk ACIA and 5/for those people with
Resmon.III the user vectors are set via the MENU program to Hexdos
warmstart on "1" and Rom Basic Utilities restart on "2".(see V4/N6
P6 and V5/N3 P15 of the newsletter for further information) Hexdos
is an interesting and compact DOS that should appeal to anyone used
to BASIC in ROM or requiring more workspace than is available with
the OSI 65D disk system. Ring, or write to me at 24 Paul Avenue
Wantirna South 3152 for further information on the DOS alterations.

THE MEETING WAS KAOS
===================

Here we are again for July. This was the early start meeting for the kids. Our thanks to all those who braved the dawn frosts on behalf of the younger generation. Proves once again that there is no such thing as a free lunch.

The June meeting was opened as usual by the inimitable Ron Cork, aided and abetted by David Anear and Jeff Rae. New faces in the crowd were welcomed and then we got down to business.

Brian Busby pointed out that the Kaos library is composed primarily of donations and that the volumes and magazines in hand were just about eligible for the pension, but that it was there for members' benefit. Brian then changed hats and called for more contributions for KAOS (what you are reading). What is wanted is material that is interesting in content, applicable to some or all the machines in the club, printed legibly (NLQ or double strike or a new ribbon, black of course) on white paper, with the printing occupying a space 170 mm wide by 260 mm long maximum per page.

The next subject for discussion was club membership. It appears that for the magazine to break even we need a minimum membership of 200. The official count at the time of writing was 196. One proposal is to send sample copies of the mag. to ex-members, especially those who dropped out due to change in machine. The club in any case now has such a variety of machines that it is no longer really 6502 based, so we are going to face up to reality and concentrate on being a 'hacker' kind of club in the sense of being 'hands on and in', in the best do-it-yourself tradition. Again what is needed is articles covering a wide variety of machines and concentrating on the 'Look, I did it my way!' approach. So get out your WP's, thinking caps, etc. and start authoring.

Ray Gardner then got up and said a few words about Rabbles, Forth courses (still on) and intelligent peach pitters. I confess I can't remember the details, I was too busy listening to take notes, sorry. As a result of this failure in my non-volatile R/W memory I find that I have to close this article, so BYE.

FOR SALE

Ohio C4P. 32k RAM, 8K ROM, RS232 Port etc. 1MHz/2MHz operation. Disk interface. 10 disks with 65DV1 to 4. Programs(50) include VCALC, dBASE, adventures, etc.
Price $400 ono.   With disk drive MPI B52 (DS) price $640 ono.
Roger Thompson

OOPS!
There is a TM ERROR in John Whitehead's May 85 Keyboard article on the second line. The keyboard hardware is at dec 57088 (hex $DF00). Not $FD00 which is the Keyboard routine in ROM.

TAPE NUMBER   EPM = IN EPROM

	Legend	
A = ASSEMBLER SOURCE CODE	ALL PROGRAMS ARE FOR
B = BASIC	8K UNLESS STATED
C = CHECKSUM FORMAT WITH LOADER FOR LOADING IN BASIC	
D = MACHINE CODE IN BASIC DATA STATEMENTS	
G = MAY NEED GARBAGE COLLECTOR FIXED. KAOS JULY 82	
M = NEEDS THE MANUAL	
S = SOUND	
T = TOKEN CHECKSUM WITH LOADER FOR LOADING IN BASIC	
S = STANDARD FORMAT, SHOULD WORK ON ANY MACHINE	
1 = C1P SUPERBOARD 24X24 OR SERIES 2	
2 = C1P SUPERBOARD SERIES 2 ONLY. 48X12	
4 = C2/C4P ONLY	
: SOME BASIC PROGRAMS MAY NEED SCREEN AND	
: KEYBOARD CONSTANTS CHANGED. SEE KAOS NOV 81	
L = GENERAL B = BUSINESS U = UTILITY R = RADIO, TV & SKY	
D = DISPLAY E = EDUCATION G = GAME	
P = PRINTER A = ADVENTURE BG= BOARD GAME	

- - UTILITY   Ø - - - - - - - - -

No.	Code	Fmt	Cat	Description
005	B	S	U	ANY BASE CONVERTOR. HEX. DEC. BINARY. OCTAL ETC.
JW	B	S	U	ANY TAPE COPIER. USED TO MAKE M/CODE COPIES. 16K
002	HM	S	U	ASSEMBLER.
EPM		2	U	ASSEMBLER. ONLY FROM D DODDS SEE KAOS MAY 85
008	TM	2	U	ASSEMBLER. WITH DABUG 3 SCREEN EDITING. KAOS JUNE 83
001	TM	S	U	ASSEMBLER. FOR MAKING AND EDITING MACHINE CODE PROGRAMS
144	B	S	U	BASIC IN ROM DISASSEMBLER. ZLIST5400
133	T	S	U	BASIC LINE REMOVER & PRINT AT. REMOVES BLOCKS.
007	C	S	U	BASIC LINE RENUMBERER. VERY FAST. GOOD. RELOCATABLE
EPM			U	BASIC RENUMBERER. SEARCH/CHANGE TRACE ETC. 8000-9FFF
MTF	B	S	U	CASSETTE FILES.
116	T	S	U	COMPSOFT EPROM PROGRAMER SOFTWARE.
116	A	S	U	COMPSOFT EPROM PROGRAMER SOURCE.
EPM			U	DABUG 3J. KAOS OCT 83
140	A	S	U	DABUG 48X24 & 48X12-24X24.
006	B	S	U	DISASSEMBLER. SYMBOLIC
.		S	U	DISASSEMBLER. NON SYMBOLIC. SEE EXTENDED MONITOR
059	B	S	U	EPROM PROGRAMER. FOR 2716 32 & 64. KAOS DEC 83
015	C	1	U	EXTENDED I/O PROCESSOR. MICRO AUG 82
009	CM	S	U	EXTENDED MONITOR. 1800-1FFF IMPROVED AS KAOS NOV 82
004	CM	S	U	EXTENDED MONITOR. 3800-3FFF IMPROVED AS KAOS NOV 82
EPM	M	S	U	EXTENDED MONITOR. E800-EFFF IMPROVED IN 2716 OR 32
003	HM	S	U	EXTENDED MONITOR. 0800-0FFF ORIGINAL
EPM		S	U	EXTENDED MONITOR PLUS. MORE ROUTINES. 2K KAOS NOV 83
124	T	.	U	FORTH. FOR 24 X 24 AND DABUG
126	T	.	U	FORTH. FOR 64 X 32 AND DABUG
125	T	.	U	FORTH. FOR 48 X 32 AND DABUG
128	T	.	U	FORTH. FOR 24 X 24 AND CEGMON
EPM			U	GARBAGE COLLECTOR COMPLETE FIX. IN 2716. KAOS JULY 82
006	B	S	U	MACHINE CODE TO BASIC DATA STATMENTS. KAOS DEC 81
141	B	S	U	MATHS BASIC DRILL. BY KINGSBURY TECH.
141	B		U	MATHS PLACE DRILL. BY KINGSBURY TECH.
102	B	S	U	MEMORY TEST IN BASIC.
142	B		U	METRIC CONVERSIONS. BY KINGSBURY TECH.
138	B	S	U	MODEM ROUTINE.
104	B		U	PACKER. PACKS BASIC LINES TOGETHER
142	B		U	PERIMETER PROBLEMS. BY KINGSBURY TECH.
133	T	S	U	PRINT AT & BASIC LINE REMOVER.
005	D	1	U	REAL TIME NMI CLOCK WITH ALARM. MODIFIED KAOS JULY 81
013	C	S	U	SEARCH/CHANGE. MICRO AUG 82 VERY GOOD $1000-1FFF
101	B	S	U	STRING SORT. DATA FILES, FILE NAMES
000	BM	S	U	TINY COMPILER. CONVERTS MORE BASIC TO M/CODE. 16K
010	BM	S	U	TINY COMPILER. CONVERTS SOME BASIC TO M/CODE. 8K
JW	B	S	U	TOKEN FAST LOAD/SAVE TAPE COPIER. KAOS OCT.NOV83
102	D	S	U	TRACE BASIC LINES. SINGLE STEP. KAOS NOV 82
...	A	S	U	TTY ASCII MODEL 33 OR 35. CAN BE PART OF WP6502 IN EPROM
EPM		S	U	TTY MODEL 15. PRINTS 2 CHAR. FOR MISSING CHAR.
088	D	S	U	TTY MODEL 15 ROUTINE. $7E60-$7FFF.
088	D	S	U	TTY MODEL 15 ROUTINE. $1E60-$1FFF.
015	C	1	U	VISIBLE MONITOR. FOR MACHINE CODE WORK

: :.   - - GENERAL   1 - - - - - - - - - - -

No.	Code	Fmt	Cat	Description
MTF	B	S	L	ADDRESS BOOK.
029	B	S	L	BIORYTHM DISPLAY.
121			L	CHEQUEING ACCOUNT.
066	B	S	L	CRICKET SCORE CARD. BY P TRUCOTT & R RICHARDSON
018	B	S	L	DAY OF WEEK CALCULATOR. ANY DAY. ANY YEAR
MTF	B	S	L	DIET AID. CALORIE COUNTER
121			L	ELECTRICITY COST.
115	B	S	L	FOURIER ANALYSIS. BY G JONES
067	B	S	L	HOME BUDGET. BY S ANDREWS
089	B	S	L	HORSE RACE SELECTOR. BY P BRODIE
103	BG	S	L	KAOS TAPE LIBRARY LIST AND SHELL SORT. 24K
JW	B	24	L	LOGIC IC SIMULATION.
026	B	S	L	MAILING LIST. SEARCH,EDIT,PRINT LABELS,DATA TAPE
018	B	S	L	PETROL CALCULATOR.
014	B	S	L	RUBIK CUBE SOLVER.
145		1	L	SAMPLE TAPE. FOR C1P
120		4	L	SAMPLE TAPE. FOR C2-4P & C4P
MTF	B	S	L	SAVINGS ACCOUNT.
041	B	S	L	ZENER DIODE REGULATOR.

: : : -- BUSINESS 2 --------------

Code						Description
109	B	S	B		B	ANNUITY. STATISTICS
MTF	B	S	B		B	BAR GRAPH GENERATOR.
122	B	S	B		B	DEBTORS SYSTEM. BY KEN MACLEAN 16K KAOS SEP 84
108	B	S	B		B	DECLINING INTEREST. LOAN FINANCE
MTF	B	S	B		B	FLOW CHART. DEMO
107	B	S	B		B	RATIO ANALYSIS.
...	B	S	B		B	SORT ROUTINE. 5 DATA FIELDS
MTF	B	S	B		B	STOCK ANALYSIS. NEEDS DATA TAPE
046	B	S	B		B	STRAIGHT AND CONST. DEPRECIATION. BREAK EVEN ANALYSIS
...	CM	S	B		B	WORD PROCESSOR WITH TELETYPE. SPECIAL ORDER
020	HM	S	B		B	WORD PROCESSOR WP6502 V1.1.
022	CM	S	B		B	WORD PROCESSOR WP6502 V1.2.
021	TM	S	B		B	WORD PROCESSOR WP6502 V1.2. FOR DABUG 48X12 AND 24X24
EPM	M	2	B		B	WORD PROCESSOR WP6502 V1.2. $8000-8FFF C1P DABUG 48X12

: : -- EDUCATION 3 --------------

Code						Description
102	B	S	E		B	CALCULATOR.
136	B	S	E		B	EXECUTION. BY DERRYL COCKS (SPELLING)
079	B	S	E		B	FRENCH QUIZ.
094	B		E		B	FUNCTION MACHINE. MATHS KAOS JULY 83
117	B	S	E		B	FUNCTION PLOT 48X48 ON 24X24. GERARD CAMPBELL
130	B		E		B	GERMAN & SPANISH TUTOR.
060	B	S	E		B	HANGMAN.
064	B	S	E		B	MASTERMIND QUIZ.
119	T	1	E		T	MATHS FOR KIDS. BY A CALVERT
095	B	S	E		B	MATHS X / - +. MEMORY FLASH. SPELLING
JM	B	S	E		JM	MUSIC. AADVARK JUNE 82. VIA DAC PORT
055	B	S	E		B	OHMS LAW TUTOR.
024	B	S	E		B	PHYSICS. ACCELERATION FORCE LIGHT RELATIVITY ELECTROSTATICS
081	B	S	E		B	QUADRATIC EQUATION SOLVER.
060	B	S	E		B	SOLAR SYSTEM QUIZ.
130	B		E		B	SPANISH & GERMAN TUTOR.
069	B	S	E		B	SPELLING TUTOR. BY HARRY MOORES
027	B	1	E		B	TOUCH TYPING TUTOR. ETI AND GR
121			E			TRIG TUTOR.

: : -- RADIO TV & COSMOS 4 ---------

Code						Description
018	B	S	R		B	DISTANCE CALCULATOR. NEEDS LONG AND LATITUDE
018	B	S	R		B	HELICAL ANTENNAE DESIGN. FOR HAMS
100	B	S	R		B	MORSE CODE TUTOR. BY P ROEHH
092	B	S	R		B	PLANET POSITIONS.
098	B	S	R		B	RHUMB LINE TRACK & DISTCLAE. BY H MOORES
081	B	S	R		B	STAR NAMER.
081	B	S	R		B	STAR RISE & FALL IN SKY CALCULATOR. BY C WYATT
019	B	S	R		B	TV PATTERN GENERATOR. COLOR. BAR. GREY SCALE ETC.
042	B	S	R		B	YAGI ANTENNE DESIGN.

Code						Description
099	B	S	G		B	CLOSE ENCOUNTERS. PRINT TYPE
051	B	S	G		B	CLOSE QUARTERS WITH IRON MONSTERS. V GOOD. KAOS SEP 83
049	C	1	G		B	COLLIDE. FAST. LIKE CRASH
121	B	S	G		B	CONCENTRATION.
JM	B	S	G		B	COSMIC DEBRIS.
JM	B	1	G		B	CRASH 4K. AS 8K BUT SLOWER SET UP
048	B	1	G		B	CRASH 8K. GOOD
050	B	1	G		B	CUBIC. 3D TYPE LE PASSE
MTA	B	4	G		B	DIGITAL COUCH. QUIZ
MTA	B	S	G		B	ELIZA. Q & A 16K
053	B	1	G		B	FIGHTER PILOT. FAIR
JM	B	S	G		B	FLIP FLOP.
056	C	1	G		B	GALAXIA. GOOD FAST KAOS NOV 82
064	B	1	G		B	GLEEP.
057	B	S	G		B	GOBBLER.
MTC	B	S	G		B	GOLF. FOR GOLFERS PRINT TYPE
JM	BS	1	G		B	GREMLINS. FROM PE
JM	B	S	G		B	HELLO.
055	B	1	G		B	HIGH NOON. FOR 2 SHOOTERS
058	B	1	G		B	HOBBIT. BY BEN FREASIER
143	C	1	G		B	INTERCEPTER. KAOS AUG 83
061	B	S	G		B	KILLERBOT.
041	B		G		B	KING ROBOT.
060	B	S	G		B	KLINGON CAPTURE. PRINT TYPE
039	B	1	G		B	LUNAR LANDER. OSI
038	B	S	G		B	LUNAR LANDER. ARD. GOOD GRAPHICS
095	B	S	G		B	MEMORY FLASH.
090	B	S	G		B	MILLENIUM FALCON.
063	C	1	G		B	MONSTER MAZE (PACKMAN). FAST GOOD KAOS FEB 84
117	B	1	G		B	MUTANT CARD MAZE BY GERARD CAMPBELL. KAOS MAY 84
113	B	4	G		B	MYSTERY MAZE.
114	B	4	G		B	NUMBER MAZE.
011	B	1	G		B	PLANET DEFENDER. BY CRAIG DILLON
JM	B	1	G		B	RATTLESNAKE. LIKE WORM.
012	B	1	G		B	REFLEX.
070	B	1	G		B	ROBOTANK. 2 PLAYERS GOOD
071	B	1	G		B	SEAWOLF.
090	B	S	G		B	SLASHBALL.
073	C	1	G		B	SPACE INVASION. FAST
074	B	1	G		B	STAR FIGHTER.
074	B	4	G		B	STAR FIGHTER.
JM	B		G		B	SURFACE ATTACK.
061	B	1	G		B	TEENAGE DRIVER. SLOW
075	BS	S	G		B	TIGER TANK.
086	B	1	G		B	TIME TREK.
114	B	4	G		B	TOWERS OF HANOI.
JM	B	2	G		B	TOWERS OF HANOI. 48X12
091	B	1	G		B	TOWERS OF HANOI. 24X24

- - BOARD GAMES 5 - - - - - -

No.			Cat	Description
137			BG	CHESS V2.1. FOR C2
139	B	4	BG	NEIGHBOURS.
062	B	S	BG	AMARI.
089	B	S	BG	BACCARAT.
045	B	1	BG	BACKGAMMON. WORKS ?
076	B	S	BG	BLACKJACK. CARD GAME
082	TM	1	BG	CHESS. SARGON II. 16K
111			BG	CHESS. ARRDVARK FOR B WILLS CHAR. SET 8K
111	TM	4	BG	CHESS. SARGON FOR B WILLS CHAR. SET 16K
083	TM	4	BG	CHESS. SARGON II. 16K
112	TM	1	BG	CHESS. SARGON FOR B WILLS CHAR. SET 16K
047	B	1	BG	CHESS V2.1. ARRDVARK 8K
052	B	1	BG	DRAUGHTS.
053	B	S	BG	FIFTEEN SQUARES. MOVE LETTERS PUZZLE
110	B	1	BG	FRUSTRATION. GOOD
067	B	S	BG	JUMPING BALLS. BY R RICHARDS
062	B	S	BG	LE PASSE TEMPS. GOOD
036	B	S	BG	MILLIONARE.
097	T	1	BG	MINI GOMOKU.
115	B	S	BG	NOUGHTS & CROSSES FOR 2. BY A BURNESS
065	B	S	BG	OLLENTO. LIKE REVERSI
092	B	1	BG	PONTOON.
JM	B	1	BG	REVERSI. GOOD
068	B	4	BG	REVERSI. GOOD
JM			BG	WORD SEARCH. WORD CAGE GENERATOR

- - GAMES 6 - - - - - - - -

No.			Cat	Description
129	B	1	G	ALIEN ERADICATOR.
JM	B	1	G	ALIEN INVADERS.
JM	B	S	G	ALIEN RAIN.
117	B	1	G	ALIEN TARGET BY GERARD CAMPELL. KAOS APR 84
135	B	S	G	ARCHARY.
040	C	1	G	ASTEROIDS. GOOD FAST
012	B	1	G	AUSSIE RACER.
075	B	1	G	AVALANCHE.
JM	B	1	G	BAGELS.
044	B	1	G	BATTLESHIP. PRINT TYPE FAIR
057	B		G	BERRRZERRK.
043	B	1	G	BLOCKADE. FOR 2 PLAYERS
042	B	S	G	BOMBER.
100	B	4	G	BOMBER.
054	BS	1	G	BOMBING RUN AND CITY BOMBER.
110	B	S	G	BOWLING. FAST
016	B		G	BREAKOUT. UK101
JM	B	1	G	BREAKTHROUGH.
098	B	1	G	BUG. BY ALAN CALVERT
121	B	S	G	CAMEL.

096	B	1	G	VIDEO TREK.
JM	B	1	G	WORM. GOOD. NEED JOYSTICKS
JM	B	S	G	WORM AND CATERPILLER. FOR 2. NEEDS 2MHZ. KAOS.
121	B		G	WUMPUS II.

- - ADVENTURE GAMES 7 - - - - - -

No.			Cat	Description
030	B	S	A	ADVENTURE SET UP AND TAPE MAKER.
032	B	1	A	CASTLE. 16K GRAPHIC ADVENTURE
033	B	S	A	DEATH SHIP. WITH SET UP
031	B	S	A	ESCAPE FROM MARS. WITH SET UP KAOS OCT 82
118	B	S	A	MIDVILLE. BY EARL MORRIS 16K
087	B	S	A	MYSTERY MANSION. BY CRAIG DILLON
035	B	S	A	NUCLEAR SUB. WITH SET UP
034	B	S	A	PYRAMID. WITH SET UP
037	B	S	A	QUEST. 12K
017	B	S	A	THE CHALICE. BY PAUL BRODIE
080	B	S	A	TREASURE QUEST. BY ED RICHARDSON. KAOS NOV.DEC 83
134			A	VAMPIRE TREASURE. BY SEN DAVIDSON

- - DISPLAY AND OR PRINTER 8 - - - - - -

No.			Cat	Description
MTC	B	S	D	BANNER. MAKES FLAGS HAS FAULT
005	B	S	D	CHRISTMAS TREE.
023	B	4	D	DIGITAL CLOCK. DISPLAY FILLS SCREEN
132	B	4	D	GRAPHICS DESIGNER.
131	B	1	D	GRAPHICS DESIGNER. LIKE S DOODLER KAOS OCT 84
072	B	S	D	GRAPHICS PLOTER. (ARROW GRAPHICS)
JM	B	1	D	LARGE LETTERS.
077	B	1	D	LIFE.
076	B	1	D	LIFE. BETTER THEN 077 BUT HAS FAULT
MTF	B	S	D	LISSAJOUS PATTERNS. BY PAUL DODD
093	B	1	D	OSI CHARACTER SET. BY B WILLS
028	B	S	D	SPARKLE/KALEIDESCOPE. DA
099	B	1	D	WORM DEMO.
MTF	B	S	DP	3D PLOT.
MTF	B	S	DP	ELECTRIC FIELD. SLOW BUT GREAT
085	B	S	DP	PASART. 16K PASCAL'S TRIANGLES. CALANDER
084	B	S	DP	PASCAL'S TRIANGLES.
MTF	B	S	DP	SINE WAVE.
MTC	B	S	P	AMAZING.
029	B	S	P	BIORYTHM CALCULATOR.
025	B	S	P	BUNNY. PRINTS PLAYBOY BUNNY
025	B	S	P	LARGE LETTERS. PRINTS ALONG THE ROLL
025	B	S	P	LOVE PLOT. USES YOUR MESSAGE